UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/785,499	02/24/2004	Monisha Ghosh	PHA 23,451A	9873

24737 7590 04/06/2007	EXAMINER
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ART UNIT	PAPER NUMBER
2611	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/06/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

PTOL-90A (Rev. 10/06)

	Application No.	Applicant(s)
Office Action Summary	10/785,499	GHOSH, MONISHA
	Examiner	Art Unit	
	Lawrence B. Williams	2611	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _3_ MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on _22 June 2004_.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) _1-11_ is/are pending in the application.

     4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-11_ is/are rejected.

7)☒ Claim(s) _1, 3,7,9-11_ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on _22 June 2004_ is/are: a)☐ accepted or b)☒ objected to by the Examiner.

     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

     a)☐ All   b)☐ Some * c)☐ None of:

       1.☐ Certified copies of the priority documents have been received.

       2.☐ Certified copies of the priority documents have been received in Application No. _____.

       3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

     * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1.   The listing of references in the Search Report is not considered to be an information

disclosure statement (IDS) complying with 37 CFR 1.98. 37 CFR 1.98(a)(2) requires a legible

copy of: (1) each foreign patent; (2) each publication or that portion which caused it to be listed;

(3) for each cited pending U.S. application, the application specification including claims, and

any drawing of the application, or that portion of the application which caused it to be listed

including any claims directed to that portion, unless the cited pending U.S. application is stored

in the Image File Wrapper (IFW) system; and (4) all other information, or that portion which

caused it to be listed. In addition, each IDS must include a list of all patents, publications,

applications, or other information submitted for consideration by the Office (see 37 CFR

1.98(a)(1) and (b)), and MPEP § 609.04(a), subsection I. states, "the list ... must be submitted on

a separate paper." Therefore, the references cited in the Search Report have not been considered.

Applicant is advised that the date of submission of any item of information or any missing

element(s) will be the date of submission for purposes of determining compliance with the

requirements based on the time of filing the IDS, including all "statement" requirements of 37

CFR 1.97(e). See MPEP § 609.05(a).

Drawings

2.   Figure 1 should be designated by a legend such as --Prior Art-- because only that which is

old is illustrated. Applicant discloses Fig. 1 as a standard DFE. See MPEP § 608.02(g).

Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office

action to avoid abandonment of the application. The replacement sheet(s) should be labeled

"Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion

of the drawing figures. If the changes are not accepted by the examiner, the applicant will be

notified and informed of any required corrective action in the next Office action. The objection

to the drawings will not be held in abeyance.

3.   The drawings are objected to under 37 CFR 1.83(a). The drawings must show every

feature of the invention specified in the claims. Therefore, the training device claimed in claim 2

must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to

the Office action to avoid abandonment of the application. Any amended replacement drawing

sheet should include all of the figures appearing on the immediate prior version of the sheet,

even if only one figure is being amended. The figure or figure number of an amended drawing

should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure

must be removed from the replacement sheet, and where necessary, the remaining figures must

be renumbered and appropriate changes made to the brief description of the several views of the

drawings for consistency. Additional replacement sheets may be necessary to show the

renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an

application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet"

pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will

be notified and informed of any required corrective action in the next Office action. The

objection to the drawings will not be held in abeyance.

Specification

4.   The disclosure is objected to because of the following informalities:

a.) On page 6, the examiner assumes the "as" after the equations is meant to follow the

word "written". The examiner suggest applicant rewrite for clarity.

b.) On page 7, the examiner assumes "3, where" in the middle of the equations is meant

to follow the word "Fig". The examiner suggest applicant rewrite for clarity.

c.) On page 8, the phrase "that is required that" should be written before the equation.

The examiner suggests applicant rewrite for clarity.

d.) On page 8, under the heading The Adaptive Filter and DDFSE, the phrase represents

the output of adaptive filter 22 as follows:" should be written before the equation. The examiner

suggests applicant rewrite for clarity.

e.) On page 8, under the heading The Adaptive Filter and DDFSE, in line 4, applicant

writes "Equation 9". The examiner is unable to find "Equation 9".

f.) On page 9, the phrase "metric (maximum likelihood decoding): " should be written

before the equation. The examiner suggests applicant rewrite for clarity. The phrase " following

metric: " should be written before the equation. The examiner suggests applicant rewrite for

clarity.

5.   The specification may not have been checked to the extent necessary to determine the

presence of all possible minor errors. Applicant's cooperation is requested in correcting any

errors of which applicant may become aware in the specification.

Claim Objections

6.   Claim 1 is objected to because of the following informalities: Claim 1 cites " a

transmitted symbol stream, noise and multipath" in line 3. The examiner assumes that applicant

means "multipath interference" or "multipaths".

Appropriate correction is required.

7.   Claims 3, 7, 9-11 are objected to because of the following informalities: The examiner

suggests applicant define the acronym "DFE" in line 1 of the claims.

Appropriate correction is required.

8.   Claim 3 is objected to because of the following informalities: The examiner suggests

applicant define the acronym "DDFSE" in line 7 of the claim.

Appropriate correction is required.

9.   Claim 7 is objected to because of the following informalities: Claim 7 cites two

variables. The examiners suggest that applicant define these variables.

Appropriate correction is required.

10.   Claim 9 is objected to because of the following informalities:

a.) Lines 6-7 are unclear, the examiner suggests " a slicer having an input and output,

wherein the slicer input is coupled to the output of the subtractor" for clarity.

11.   Claim 10 is objected to because of the following informalities:

a.) Lines 6-7 are unclear, the examiner suggests " a slicer having an input and output,

wherein the slicer input is coupled to the output of the subtractor" for clarity.

b.) Lines 10-11 are unclear, the examiner suggests " an adaptive filter having an input

and output, wherein the adaptive filter input is coupled to the output of the subtractor.

c.) The examiner suggests applicant define the acronym "DDFSE" in line 12 of the claim.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

12.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

13.   Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing

to particularly point out and distinctly claim the subject matter which applicant regards as the

invention. Claim 6 cites "wherein the adaptive filter" followed by an equation. It is unclear as

what the equation represents in the claim as applicant has referred to this equation in the last

paragraph of page 7 thru the top of page 8 as a power constraint. The claim also cites " further

includes a device for comparing", but fails to disclose what is being compared. The examiner

suggests applicant rewrite the claim to clearly and distinctly point out the subject matter regarded

as the invention.

14.   Claim 7 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing

to particularly point out and distinctly claim the subject matter which applicant regards as the

invention. Claim 7 cites a method, which includes steps of receiving, adaptively filtering, and

providing of two variables. As presented, it is unclear as what the variables represents in the

claim. The examiner assumes from the specification applicant is referring to a quantized signal

and an error. The examiner suggests applicant rewrite the claim to clearly and distinctly point out

the subject matter regarded as the invention.

Claim Rejections - 35 USC § 102

15.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

16.   Claim 11 is rejected under 35 U.S.C. 102(e) as being anticipated by Alelyunas et al. US

Patent 6,285,709 B1.

Alelyunas et al. discloses in Fig(s) 4 and 5, a device for improving DFE performance,

comprising: DFE means (84) having an input and an output for providing a DFE output signal;

and adaptive filter means (102) coupled to the output of the DFE for adaptively filtering the DFE

output signal and thereby whitening noise in the DFE output signal (col. 2, line 51-col. 3, line

10). Alelyunas et al. discloses the invention to provide error filtering, which would inherently

whiten noise in the DFE signal.

Claim Rejections - 35 USC § 103

17.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

18.   Claims 1, 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's

Admitted Prior Art in view of Barksdale (US 2003/0193366 A1).

        (1) With regard to claim 1, Applicant's Admitted Prior Art discloses in Fig. 1, a decision

feedback equalizer (10), (DFE) comprising: an input which receives an input signal comprising,

a transmitted symbol stream, noise and multipath (pg. 1, lines 20-22); a DFE output (20) which

provides a DFE output signal; a forward filter (12) which filters the input signal; a decision

feedback loop comprising a subtractor (18), a slicer, and a feedback filter (16), wherein the

subtractor is coupled to both an output of the forward filter and an output of the feedback filter

and subtracts the output of the feedback filter from the output of the forward filter to provide the

DFE output signal which is applied to an input of the slicer. Applicant's Admitted Prior Art does

not disclose an adaptive filter, coupled to the DFE output, to adaptively filter the DFE output,

and whiten an error in the DFE output signal.

Adaptive filters for whitening are well known in the art as taught by Barksdale. Barksdale

discloses in Fig(s). 2A, 2B, an adaptive filter (240), coupled to adaptively filter an output, and

whiten an error in the output signal (pg. 5, paragraphs [0060-0061]). Though Barksdale does not

teach the adaptive filter coupled to a DFE output, one skilled in the art would have been

motivated to use such a filter on the output of the DFE as a known method of signal whitening

which would enhance the performance of the trellis decoder (Fig. 1, pg. 2, lines 20-21).

(2) With regard to claim 8, claim 8 discloses the method of the decision feedback

equalizer disclosed in claim 1. Therefore a similar rejection applies.

19.   Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's

Admitted Prior Art in view of Barksdale (US 2003/0193366 A1) as applied to claim 1, and

further in view of Dagdeviren (US Patent 6,118,812).

As noted above, the combination of Applicant's Admitted Prior and Barksdale disclose

all limitations of claim 1. They do not however disclose the DFE as claimed in claim 1, further

including a training device, which trains the adaptive filter to minimize the mean squared error in

the DFE output.

However, a training device for training an adaptive filter to minimize the mean squared

error is well known in the art. Dagdeviren teaches in Fig. 1, a training device (103) for an

adaptive filter (102), which minimizes the mean square error of an error signal (col. 4, lines 51-

55).

One of ordinary skill in the art would have been motivated to incorporate the teachings of

Dagdeviren as a known method of eliminating intersymbol interference.

20.   Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's

Admitted Prior Art in view of Barksdale (US 2003/0193366 A1).

(1) With regard s to claim 3, Applicant's Admitted Prior Art discloses in Fig. 1, a device

for improving DFE performance, comprising: an input (Trellis Decoder) which receives an

output of a DFE (20). Applican's Admitted Prior art does not teach the configuration of an

adaptive filter having an adaptive filter input and an adaptive filter output, the adaptive filter

input coupled to the an output coupled to the adaptive filter output for supplying an output signal

to a DDFSE trellis decoder, which output signal is the DFE output signal with a smaller whiter

error than the error in the output of the DFE.

However, adaptive filters for whitening are well known in the art as taught by Barksdale.

Barksdale discloses in Fig(s). 2A, 2B, an adaptive filter (240), coupled to adaptively filter an

output, and whiten an error in the output signal (pg. 5, paragraphs [0060-0061]). Though

Barksdale does not teach the adaptive filter coupled to a DFE output, one skilled in the art would

have been motivated to use such a filter inserted between the DFE output and the decoder input

as a known method of signal whitening which would enhance the performance of the trellis

decoder (Fig. 1, pg. 2, lines 20-21).

21.   Claims 4-5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's

Admitted Prior Art in view of Barksdale (US 2003/0193366 A1) as applied to claim 3, and

further in view of Dagdeviren (US Patent 6,118,812).

(1) With regard to claim 4, as noted above, the combination of Applicant's Admitted

Prior and Barksdale disclose all limitations of claim 3. Furthermore as noted above, Barksdale

discloses in Fig(s) 2A, 2B, an adaptive filter (240), coupled to adaptively filter an output, and

whiten an error in an output signal (pg. 5, paragraphs [0060-0061]). They do not however

disclose an adaptive filter adapted to receive a training sequence that adapts a filter taps in the

adaptive filter.

However, Dagdeviren teaches in Fig. 1, an adaptive filter (102) adapted to receive a

training sequence that adapts filter taps in the adaptive filter (col. 2, line 65-col. 3, line 12).

It would have been obvious to one skill in the art at the time of invention to incorporate

the well-known teachings of Dagdeviren as a known method of noise cancellation.

(2) With regard to claim 5, Dagdeviren also discloses wherein the adaptive filter further

includes a LMS algorithm, which is used to adapt the filter taps (col. 4, lines 51-55).

22.   Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's

Admitted Prior Art in view of Barksdale (US 2003/0193366 A1).

Applicant's Admitted Prior Art discloses in Fig. 1, a method of improving DFE

performance, comprising the steps of receiving an output (20) from the DFE (10), which includes

a quantized signal (a_k) and an error (e_k) and providing both the quantized signal and the error to a

DDFSE (Trellis Decoder; pg. 2, lines 21).

Applicant's Admitted Prior Art does not teach adaptively filtering the quantized signal

(a_k) and an error (e_k) and providing the adaptively filtered (a_k) and (e_k) to a DDFSE.

However, adaptive filters for whitening are well known in the art as taught by Barksdale.

Barksdale discloses in Fig(s). 2A, 2B, an adaptive filter (240), coupled to adaptively filter an

output, and whiten an error in the output signal (pg. 5, paragraphs [0060-0061]). Though

Barksdale does not teach the adaptive filter coupled to a DFE output, one skilled in the art would

have been motivated to use such a filter on an output of the DFE as a known method of signal

whitening which would enhance the performance of the DDSFE (trellis decoder) (Fig. 1, pg. 2,

lines 20-21).

23.   Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's

Admitted Prior Art in view of Barksdale (US 2003/0193366 A1).

        Applicant's Admitted Prior art teaches in Fig. 1, a DFE, comprising: a forward filter (12),

having an input which receives an input signal and a forward filter output; a subtractor (18)

having a first input coupled to the forward filter output and having a second input and a

subtractor output; a slicer (14) having an input coupled to the output of the subtractor and a slicer

output; a feedback filter (16) coupled to the slicer output and the second input of the subtractor.

Applicant's Admitted Prior Art does not teach an adaptive filter coupled to the output of the

subtractor (DFE output).

        However, adaptive filters for whitening are well known in the art as taught by Barksdale.

Barksdale discloses in Fig(s). 2A, 2B, an adaptive filter (240), coupled to adaptively filter an

output, and whiten an error in the output signal (pg. 5, paragraphs [0060-0061]). Though

Barksdale does not teach the adaptive filter coupled to an output of subtractor (DFE output), one

skilled in the art would have been motivated to use such a filter on an output of subtractor

(output of the DFE) as a known method of signal whitening which would enhance the

performance of the trellis decoder (Fig. 1, pg. 2, lines 20-21).

24.   Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Applicant's

Admitted Prior Art in view of Barksdale (US 2003/0193366 A1).

Applicant's Admitted Prior art teaches in Fig. 1, a television receiver, including a DFE,

comprising: a forward filter (12), having an input for receiving an input signal and a forward

filter output; a subtractor (18) having a first input coupled to the forward filter output and having

a second input and a subtractor output; a slicer (14) having an input coupled to the output of the

subtractor and a slicer output; a feedback filter (16) coupled to the slicer output and the second

input of the subtractor; a DDFSE having an input coupled to an output of the subtractor.

Applicant's Admitted Prior Art does not teach an adaptive filter having an input coupled to the

output of the subtractor and an adaptive filter output; and a DDFSE having an input coupled to

an output of the adaptive filter.

However, adaptive filters for whitening are well known in the art as taught by Barksdale.

Barksdale discloses in Fig(s). 2A, 2B, an adaptive filter (240), coupled to adaptively filter an

output, and whiten an error in the output signal (pg. 5, paragraphs [0060-0061]). Though

Barksdale does not teach the adaptive filter coupled to an output of subtractor, (DFE output) one

skilled in the art would have been motivated to use such a filter on an output of subtractor

(output of the DFE) as a known method of signal whitening which would enhance the

performance of the trellis decoder (Fig. 1, pg. 2, lines 20-21).

Double Patenting

25.   The nonstatutory double patenting rejection is based on a judicially created doctrine
grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or
improper timewise extension of the "right to exclude" granted by a patent and to prevent possible
harassment by multiple assignees.   A nonstatutory obviousness-type double patenting rejection

is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

26.   Claims 1-2 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-2 of U.S. Patent No. 6,724,844 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim(s) 1-2 of US Patent No. 6,724,844 B1 herein referred to as "844" contain(s) every element of claim(s) 1 and 2 of the instant application and as such anticipate(s) claim(s) 1 and 2 of the instant application. Claim 1 of the instant application discloses a decision feedback equalizer comprising: an input which receives an input signal comprising, a transmitted symbol stream, noise and multipath, disclosed in lines 3-5 of claim 1 of "844"; a DFE output which provides a DFE output signal, disclosed in line 6; a forward filter which filters the input signal, line 7; a decision feedback loop comprising a subtractor, a slicer, and a feedback filter, wherein the subtractor is coupled to both an output of the forward filter and an output of the feedback filter and subtracts the output of the feedback filter from the output of the forward filter to provide the DFE output signal which is applied to an input of the slicer, disclosed in lines 8-14, and an

adaptive filter, coupled to the DFE output, to adaptively filter the DFE output, and whiten an

error in the DFE output signal, disclosed in lines 15-18 of "844". Though line 15 of "844" cites

"the adaptive filter having an input coupled to the output of the subtractor", this is disclosed in

the instant application, "coupled to the DFE output" in line 12, since lines 9-10 of the instant

application cite, "wherein the subtractor is coupled to both an output of the forward filter and an

output of the feedback filter and subtracts the output of the feedback filter from the output of the

forward filter to **provide the DFE output signal**". Thus "844" discloses all limitations of claim

1 of the instant application.

Regarding claim 2, claim 2 of the instant application and claim 2 of "844" both cite the

same limitations.

27.   Claim 3 is rejected on the ground of nonstatutory obviousness-type double patenting as

being unpatentable over claim 5 of U.S. Patent No. 6,724,844 B1. Although the conflicting

claims are not identical, they are not patentably distinct from each other because claim 5 of US

Patent No. 6,724,844 B1 herein referred to as "844" contain(s) either explicitly or inherently

every element of claim 3 of the instant application and as such anticipate(s) claim 3 of the instant

application. Claim 3 of the instant application discloses" a device for improving DFE

performance, comprising: an input which receives an output of a DFE (claim 5 of "844"

discloses a DFE (forward filter, line 3, feedback filter, line 13); an adaptive filter having an

adaptive filter input and an adaptive filter output, the adaptive filter input coupled to the

Input (claim 5 discloses a subtractor coupled to the DFE (lines 8-14) whose output is an input

into the adaptive filter, lines 15-16 with an adaptive filter output, lines 20-21; and an output

coupled to the adaptive filter output for supplying an output signal to a DDFSE trellis decoder, which output signal is the DFE output signal with a smaller whiter error than the error in the output of the DFE (lines 15-22).

28.   Claims 4-5 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of U.S. Patent No. 6,724,844 B1 in view of Forney, Jr. US Patent 3,723,911.

Regarding claim 4, as noted above, claim 5 of US Patent 6,724,844 B1 discloses all limitations of claim 3, above. The claims of US Patent 6,724,844 B1 do not however teach the device as claimed in claim 3, wherein the adaptive filter is adapted to receive a training sequence that adapts filter taps in the adaptive filter such that the adaptive filter acts to whiten the error in the output of the DFE.

Though Forney, Jr. is silent on the subject of a DFE or whitening the output of the DFE, adaptive filters adapted to receive a training sequence are well known in the art. Forney, Jr. teaches in Fig(s). 1 and 2, an adaptive filter adapted to receive a training sequence that adapts filter taps in the adaptive filter (abstract).

One skilled in the art at the time of invention would have been motivated to incorporate an adaptive filter receiving a training sequence as a known method of equalization, ie, to whiten the error of a received signal.

Regarding claim 5, Forney et al also discloses the device as claimed in claim 4, wherein the adaptive filter further includes a LMS algorithm, which is used to adapt the filter taps (col. 2, lines 31-35).

One skilled in the art at the time of invention would have been motivated to incorporate

an adaptive filter receiving a training sequence as a known method of equalization, ie, to whiten

the error of a received signal.

29.   Claim 7 is rejected on the ground of nonstatutory obviousness-type double patenting as

being unpatentable over claim 5 of U.S. Patent No. 6,724,844 B1. Although the conflicting

claims are not identical, they are not patentably distinct from each other because claim 5 of US

Patent No. 6,724,844 B1 herein referred to as "844" contain(s) either explicitly or inherently the

steps of claim 7 of the instant application and as such anticipate(s) claim 3 of the instant

application. Claim 7 of the instant application discloses" a method for improving DFE

performance, comprising the steps of: receiving an output signal from the DFE which includes a_k

+ e_k ; adaptively filtering a_k + e_k; providing the adaptively filtered a_k + e_k to a DDFSE. From

applicant's specification, the examiner assumes that the variables are meant to represent a

transmitted symbol stream plus noise and intersymbol interference. Thus claim 5 of "844"

discloses the input signal comprising a transmitted symbol stream plus noise and intersymbol

interference (lines 4-7). This transmitted symbol stream plus noise is also received as an output

from the DFE (forward filter, line 3, feedback filter, line 13). This output from the DFE is

supplied to the adaptive filter via the subtractor coupled to the output of the DFE (lines 15-16),

and then the adaptively filtered signal is supplied a DDFSE (lines 15-22).

30.   Claim 8 is rejected on the ground of nonstatutory obviousness-type double patenting as

being unpatentable over claim 3 of U.S. Patent No. 6,724,844 B1. Although the conflicting

claims are not identical, they are not patentably distinct from each other because claim 8 of US

Patent No. 6,724,844 B1 herein referred to as "844" contain(s) every element of claim 8 of the

instant application and as such anticipate(s) claim 8 of the instant application. Claim 8 of the

instant application discloses a method of decision feedback equalizing, comprising the steps of:

receiving an input signal comprising a plurality of symbols, noise and multipath, disclosed in

lines 3-5 of "844"; forward filtering the received signal using a forward filter having a plurality

of taps, disclosed in lines 7-8; subtracting from the forward filtered signal a feedback filtered

signal to provide a decision feedback output, disclosed in lines 9-10; quantizing the decision

feedback output to the nearest symbol to provide a quantized output, disclosed in lines 11-12;

feedback filtering the quantized output to provide the feedback filtered signal, disclosed in lines

13-14; and adaptively filtering the decision feedback output, lines 15-16.

31.   Claim 9 is rejected on the ground of nonstatutory obviousness-type double patenting as

being unpatentable over claim 4 of U.S. Patent No. 6,724,844 B1. Although the conflicting

claims are not identical, they are not patentably distinct from each other because claim 4 of US

Patent No. 6,724,844 B1 herein referred to as "844" contain(s) every element of claim 9 of the

instant application and as such anticipate(s) claim(s) 1 and 2 of the instant application. Claim 9

of the instant application discloses a DFE, comprising: a forward filter, having an input which

receives an input signal and a forward filter output, disclosed in lines 2-3; a subtractor having a

first input coupled to the forward filter output and having a second input and a subtractor output,

disclosed in line 7-9; a slicer having an input coupled to the output of the subtractor and a slicer

output, disclosed in lines 10-12; a feedback filter coupled to the slicer output and the second

input of the subtractor, lines 12-13; and an adaptive filter coupled to the output of the subtractor, disclosed in lines 14-15.

32.   Claim 10 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 5 of U.S. Patent No. 6,724,844 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 5 of US Patent No. 6,724,844 B1 herein referred to as "844" contain(s) every element of claim 10 of the instant application and as such anticipate(s) claim 10 of the instant application. Claim 10 of the instant application discloses a television receiver, including a DFE, comprising: a forward filter, having an input for receiving an input signal and a forward filter output, disclosed in lines 3-4 of "844'; a subtractor having a first input coupled to the forward filter output and having a second input and a subtractor output, disclosed in lines 8-10 of "844"; a slicer having an input coupled to the output of the subtractor and a slicer output, disclosed in lines 11-13 of "844"; a feedback filter coupled to the slicer output and the second input of the subtractor, disclosed in lines 13-14 of "844"; an adaptive filter having an input coupled to the output of the subtractor and an adaptive filter output, disclosed in lines 15-17; and a DDFSE having an input coupled to an output of the adaptive filter, disclosed in lines 19-21 of "844". Thus, the limitations of claim 10 of the instant application are all disclosed by claim 5 of US Patent 6,724,244 B1.

33.   Claim 11 is rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 6 of U.S. Patent No. 6,724,844 B1. Although the conflicting claims are not identical, they are not patentably distinct from each other because claim 6 of US

Patent No. 6,724,844 B1 herein referred to as "844" contain(s) every element of claim 11 of the instant application and as such anticipate(s) claim 11 of the instant application. Claim 6 of the instant application discloses a device for improving DFE performance, comprising: DFE means having an input and an output for providing a DFE output signal, disclosed in lines 3-7 of claim 6 of "844"; and adaptive filter means coupled to the output of the DFE for adaptively filtering the DFE output signal and thereby whitening noise in the DFE output signal, disclosed in lines 9-12 of claim 6 of "844".

Allowable Subject Matter

34.   Claim 6 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph and under 35 U.S.C. 101 set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

35.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a.) Lu discloses in US Patent 5,777,910 Sparse Equalization Filter Adaptive In Two Dimensions.

b.) Kim et al. discloses in US Patent 6,570,863 B1 Apparatus And Method For Adaptive CDMA Detection Based On Constrained Minimum Mean Squared Error Criterion.

c.) Chu et al. discloses in US Patent 6,934,345 B2 Apparatus, Method And System For

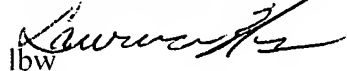Correlated Noise Reduction In A Trellis Coded Environment.

d.) Forney, Jr. discloses in US 3,723,911 Training Adaptive Linear Filters.

36.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Lawrence B Williams whose telephone number is 571-272-3037.

The examiner can normally be reached on Monday-Friday (8:00-6:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Ghayour Mohammad can be reached on 571-272-3021. The fax phone number for

the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished

applications is available through Private PAIR only. For more information about the PAIR

system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Lawrence B. Williams
lbw
April 1, 2007

**MOHAMMED GHAYOUR
SUPERVISORY PATENT EXAMINER**